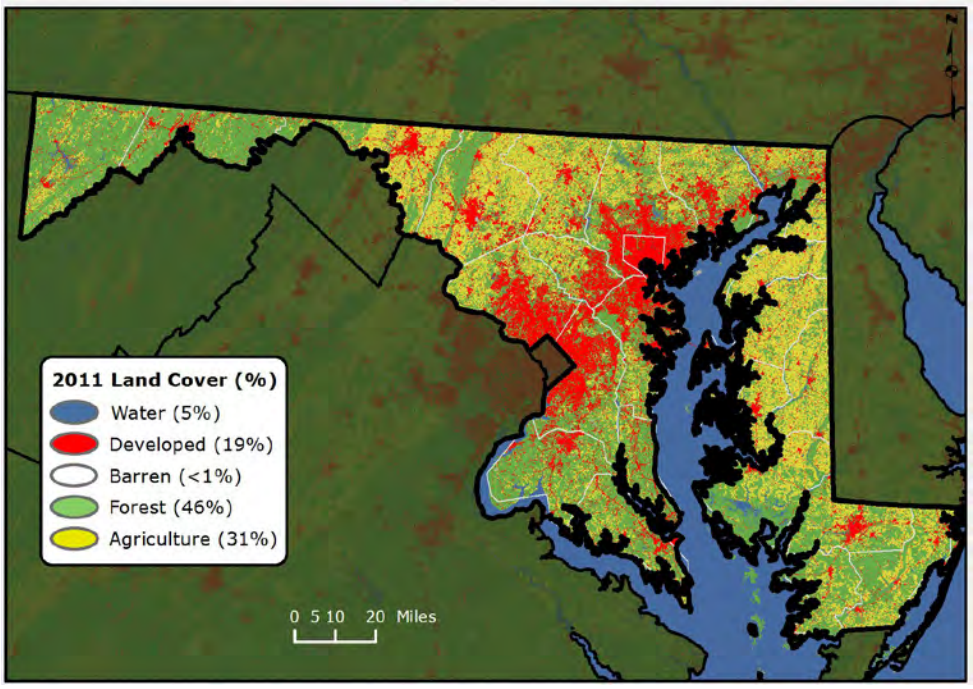
USDA United States Department of Agriculture

2016 Forest Health highlights

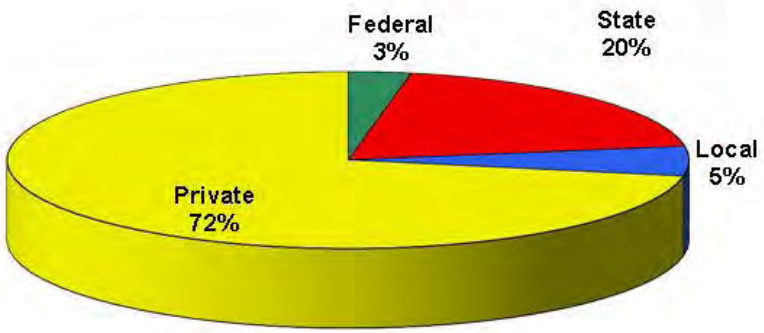
MARYLAND

Forest Resource Summary

Maryland occupies a land area of 6,264,876 acres. Forest land comprises 2,709,062 acres, of which 72 percent is privately owned. Healthy, productive forests are critical in urban and rural areas for soil conservation, clean air and water, wildlife habitat, outdoor recreation, and aesthetics. The forest products industry is the largest employer in Allegany and Garrett Counties and the second largest employer on the Eastern Shore.



Forest Land Ownership in Maryland, 2012

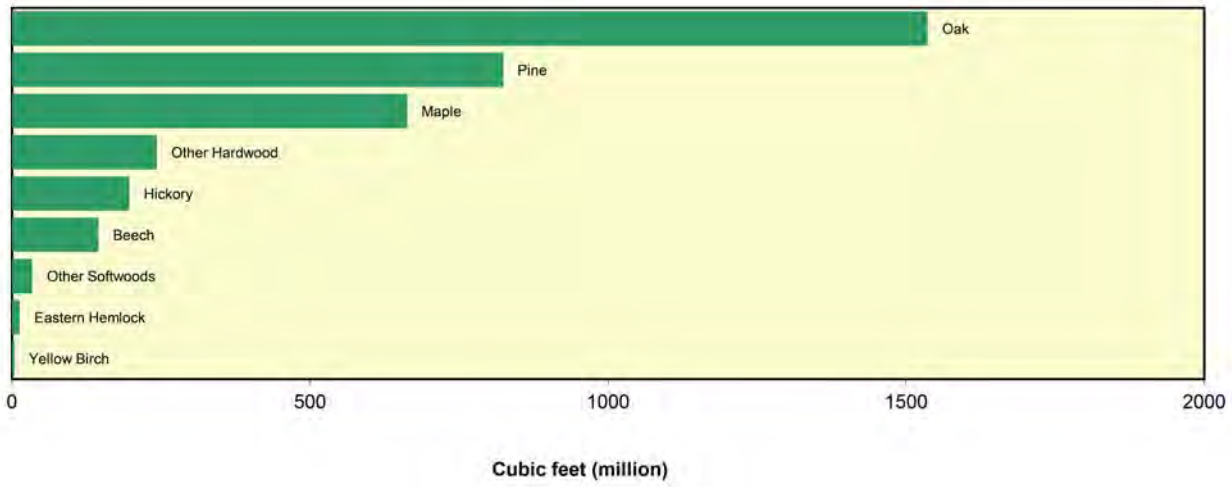


Forest Service
Northeastern Area
State and Private Forestry

Maryland Department of Natural Resources

March 2017

Net Volume of Growing Stock on Timberland by Species in Maryland, 2012



Forest Health Surveys

Maryland forest health is surveyed by both aerial flights and on the ground. In 2016, gypsy moth defoliated 5 acres of oak in Talbot County on the Eastern Shore. Five acres of hickory drought damage were also recorded in 2016. A total of 50,406 acres of forest were found to be affected by saltwater intrusion. The majority of the affected acres, 39,503, were in Dorchester County. Somerset, Worcester, and Wicomico Counties were also affected by saltwater intrusion. Southern pine beetle damage occurred on at least 300 acres on the Eastern Shore as well.

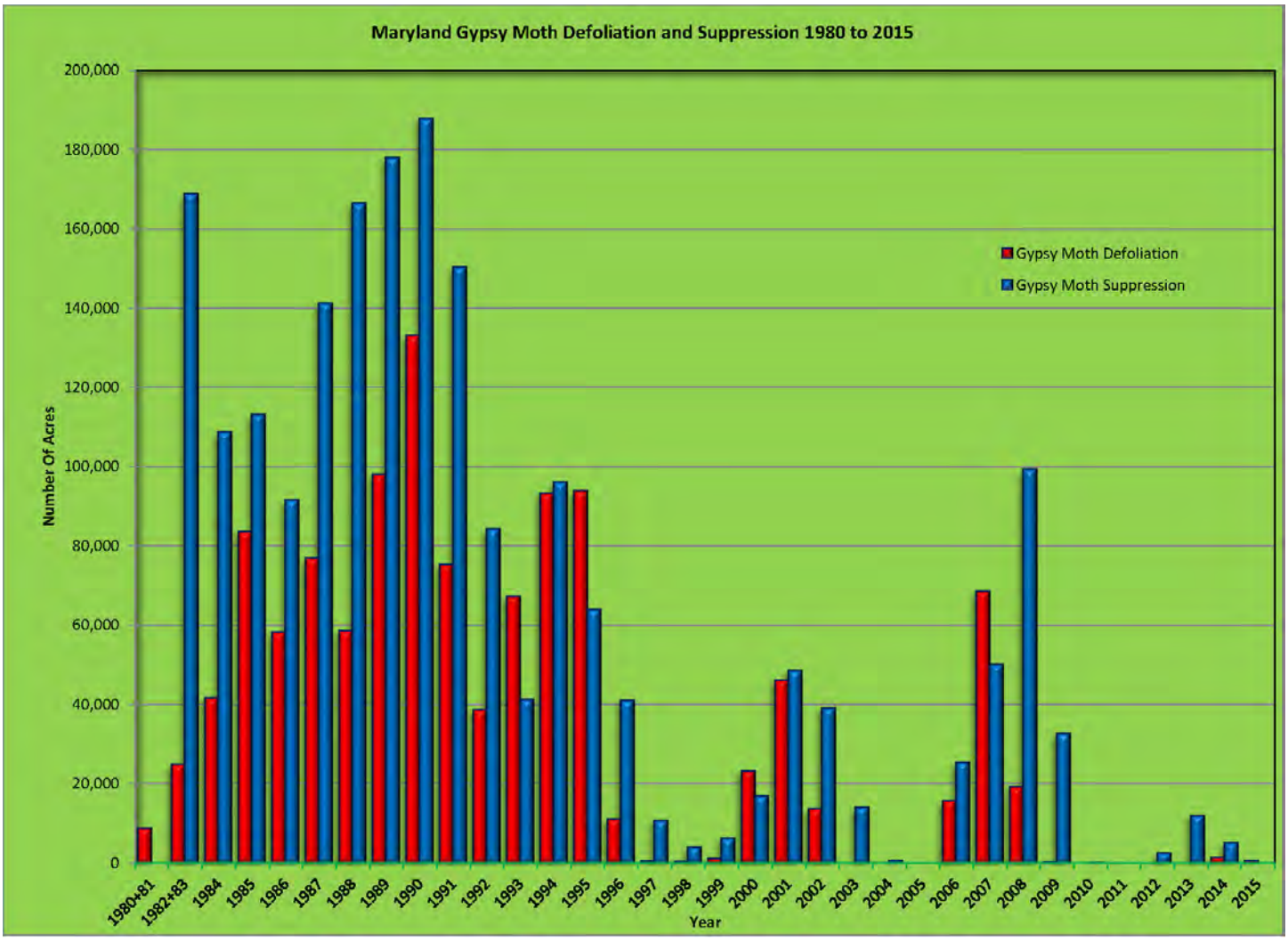
Mature chestnut and red oaks are dying in Maryland's most northern tier counties and one county on the Eastern shore. Trees have been tested by a U.S. Forest Service pathologist, and the results were found to be inconclusive. Secondary pests are present, but are likely not the cause of mortality.

Forest Pest Issues

Gypsy Moth

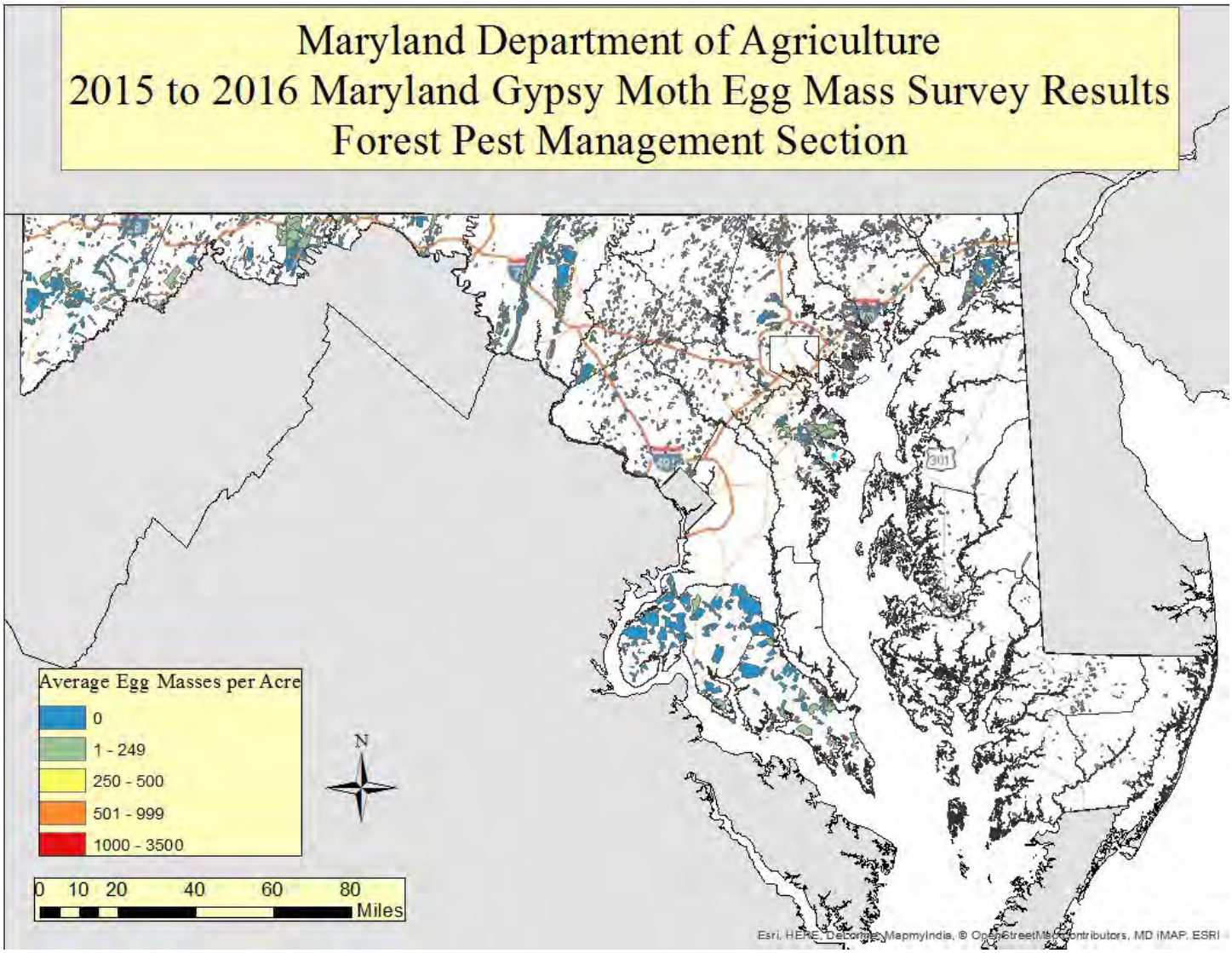
The gypsy moth is the most serious threat to oak forests in the United States. The first eggs were detected in Maryland in 1971, and the first extensive defoliation occurred in 1981. Each fall and winter, the Maryland Department of Agriculture (MDA) conducts an extensive survey for gypsy moth egg masses to determine potential areas of defoliation. From August 2015 through March 2016, MDA Forest Pest Management (FPM) personnel conducted gypsy moth egg mass surveys on 514,079 acres of "high-value" forested lands. "High-value" forested sites include areas with development, recreational use, managed forest and wildlife resources, and other site conditions that render dieback and mortality economically and socially important.

The survey results indicated that the 2015 populations were sufficient to cause moderate to heavy defoliation on 1,002 acres of high-value rural and urban forest on the Eastern Shore in 2016. MDA conducted an aerial application of *Btk* on these 1,002 acres in Talbot, Dorchester, Somerset, Wicomico, and Worchester Counties in 2016. Weather conditions in the spring of 2016 were favorable for the *Entomophaga maimaiga* fungus, which reduced gypsy moth populations across the State. Only 5 acres of gypsy moth defoliation were detected in Talbot County on the Eastern Shore with no defoliation elsewhere in the State.

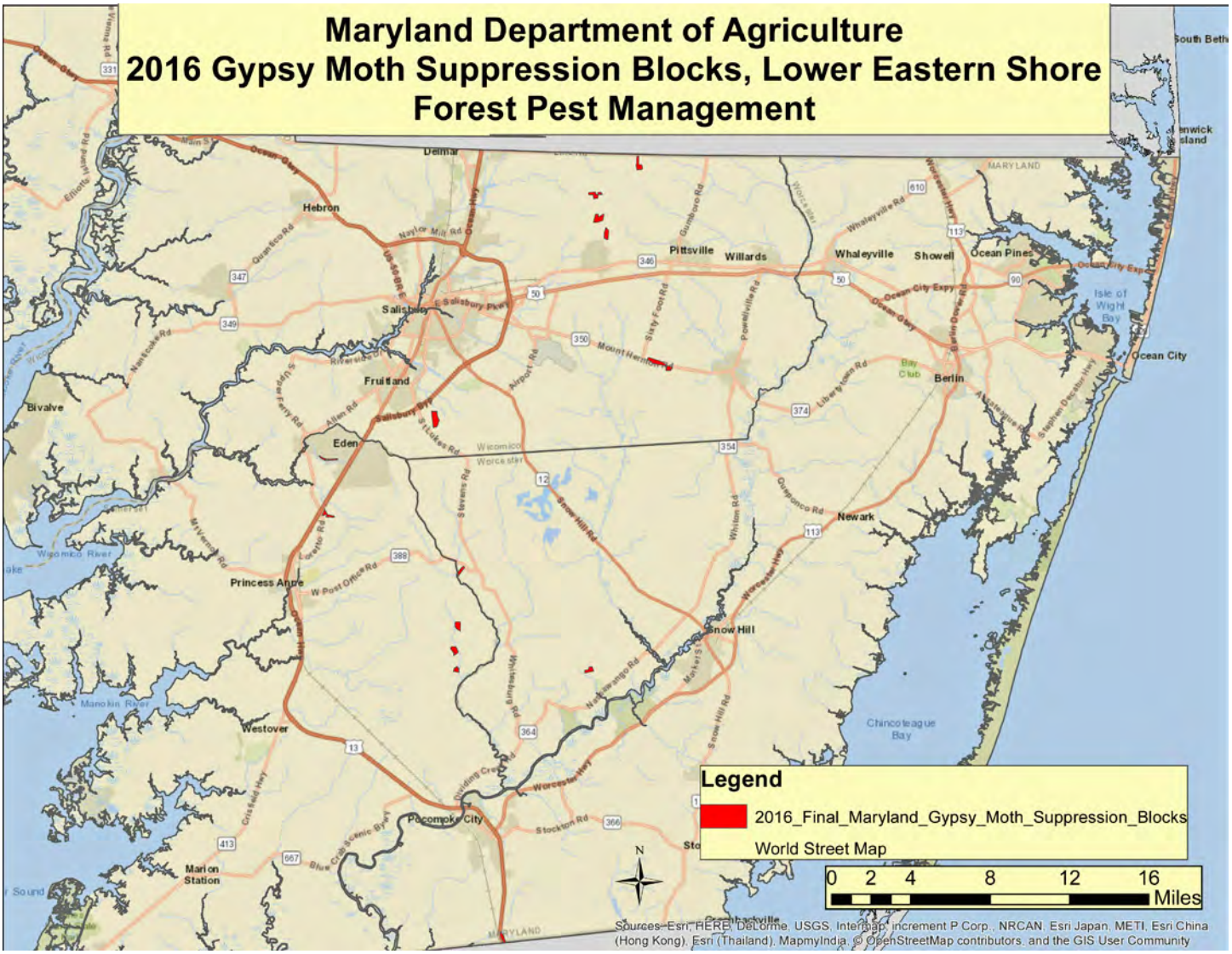


Maryland gypsy moth defoliation and suppression from 1980 to 2015.

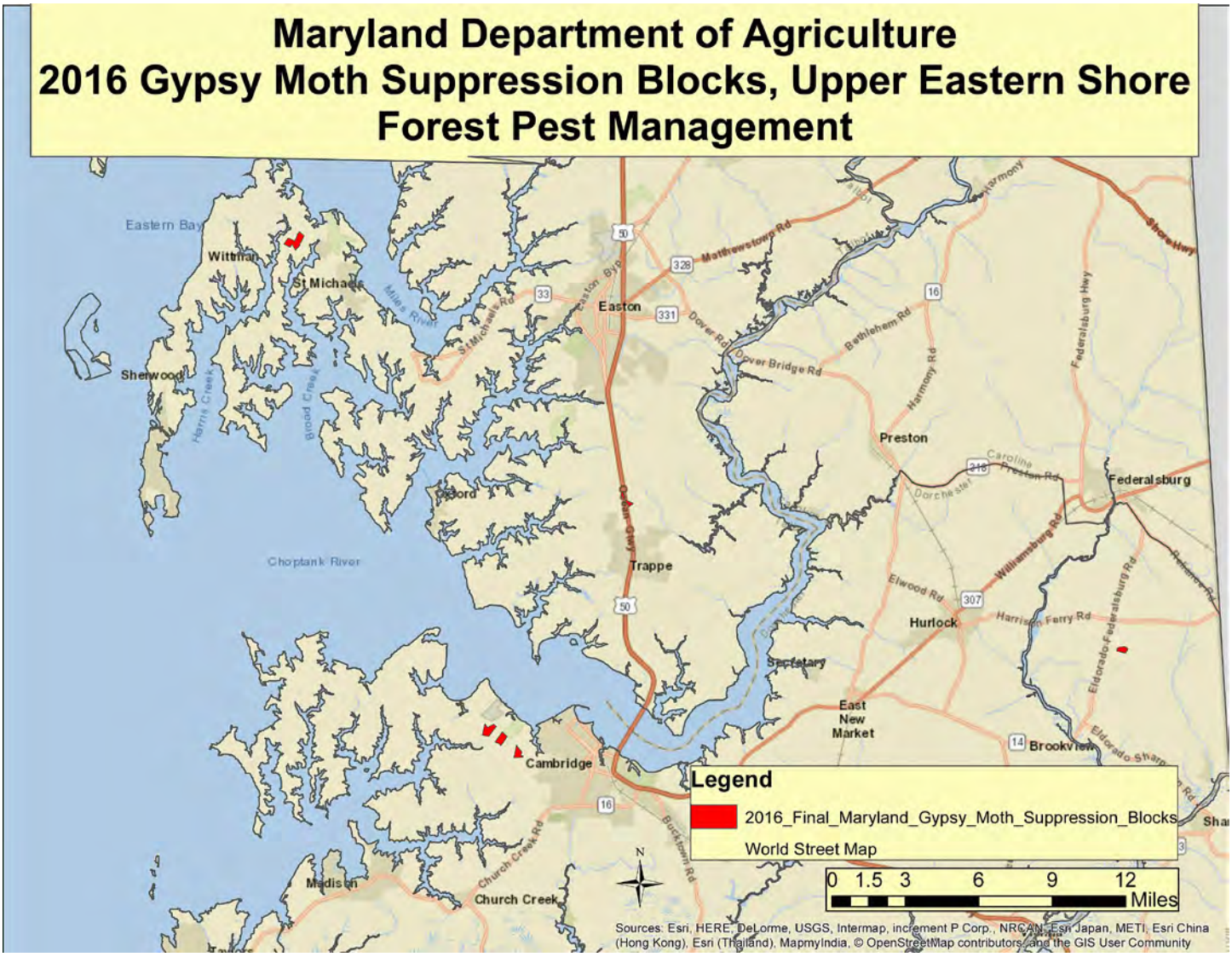
This map depicts the results of gypsy moth egg mass surveys.


Maryland Department of Agriculture
2015 to 2016 Maryland Gypsy Moth Egg Mass Survey Results
Forest Pest Management Section
Average Egg Masses per Acre
0
1 - 249
250 - 500
501 - 999
1000 - 3500
N
0 10 20 40 60 80
Miles
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, MD iMAP, ESRI

MDA 2015 to 2016 gypsy moth egg mass survey results.



MDA 2016 gypsy moth suppression blocks for the Lower Eastern Shore.



MDA 2016 gypsy moth suppression blocks for the Upper Eastern Shore.

Hemlock Woolly Adelgid

Hemlock woolly adelgid (HWA) remains the major threat to the health of eastern hemlock. Infested hemlocks occur in the metropolitan area between Baltimore and Washington and in natural stands from Harford to Garrett Counties. Biocontrol efforts to combat HWA began in 1999; more than 47,000 HWA predators representing five different species have been released throughout the State since that time. In recent years our efforts have focused on *Laricobius nigrinus*, *Laricobius osakensis*, and *Scymnus coniferarum*.

In the fall of 2015, 2,474 predatory beetles were released at five sites: two in Garrett County and one each in Allegany, Frederick, and Harford Counties. FPM has established a *Laricobius nigrinus* "nursery" at Rocky Gap State Park; many beetles have been caught there and released in other hemlock stands throughout Maryland in recent years. In 2015, 359 *L. nigrinus* were moved from Rocky Gap to the Frederick County site. In the fall of 2016, a total of 325 *L. nigrinus* were released in Maryland.

Maryland Department of Agriculture
Forest Pest Management
Maryland Hemlock Woolly Adelgid Predator Releases 2003–2016

Hemlock Stand	County	*Laricobius nigrinus*	*Laricobius osakensis*	*Scymnus coniferarum*	*Scymnus sinuanodulus*	*Sasajiscymnus tsugae*
Rocky Gap State Park	Allegany	3,476	0	105	0	5,000
Prettyboy Reservoir	Baltimore	2,672	0	0	0	0
Cunningham Falls State Park	Frederick	810	0	0	0	0
Frederick City Watershed	Frederick	2,381	0	0	945	0
Broad Creek Scout Camp	Harford	2,302	0	0	0	15,410
Rocks State Park	Harford	1,424	0	0	0	0
Hagerstown Watershed	Washington	853	0	0	0	0
Big Run (Savage River SF)	Garrett	1,685	0	0	0	0
Big Run State Park	Garrett	50	0	0	0	0
Dry Run (Savage River SF)	Garrett	150	0	0	0	0
Frostburg Watershed	Garrett	300	0	0	0	0
Laurel Run (Potomac SF)	Garrett	1,000	0	0	0	0
Lostland Run (Potomac SF)	Garrett	1,500	500	0	0	0
Poplar Lick (Savage River SF)	Garrett	2,289	1,510	0	0	0
Elk Lick (Savage River SF)	Garrett	1,491	500	0	0	0
Gunpowder Falls State Park	Baltimore	0	1,010	0	0	0
Total	**n/a**	**22,383**	**3,520**	**105**	**945**	**20,410**

Hemlock Woolly Adelgid Suppression

In 2003–2004, a joint task force of the MDA Forest Pest Management Section (MDA-FPM) and Maryland Department of Natural Resources experts addressed the multidisciplinary needs of the HWA infestation. The task force prioritized more than 50 hemlock stands and selected them as the sites for joint suppression efforts (chemical and/or biocontrol). Only publicly owned or public use sites would be part of this suppression project. Currently, the chemical option involves treating hemlock trees with the insecticide imidacloprid by one of two methods – trunk injection or soil injection. The biocontrol option involves releasing HWA predators into the hemlock stands in an effort to reduce HWA populations.

From 2004 to the present, over 68,000 hemlock trees have been treated. A total of 10,948 hemlock trees (representing 119,255 inches d.b.h.) were treated in Maryland between July 1, 2015, and June 30, 2016. Of this total, 2,045 trees (representing 21,244 inches d.b.h.) were trunk (stem) injected, and 8,903 trees (representing 98,011 inches d.b.h.) were soil (includes CoreTect) injected.

Maryland Department of Agriculture
Forest Pest Management
Fall 2015 – Spring 2016 Imidacloprid Treatments for Hemlock Woolly Adelgid Control in Maryland

Hemlock Stand	County	Trunk Injection (# trees)	Trunk Injection (in. d.b.h.*)	Soil Injection (# trees)	Soil Injection (in. d.b.h.*)	Total (# trees)	Total (in. d.b.h.*)
Prettyboy Reservoir	Baltimore	0	0	527	4,179.0	527	4,179.0
Frederick Watershed	Frederick	79	1,149.5	0	0	79	1,149.5
Hunting Creek CFSP	Frederick	0	0	81	799.0	81	799.0
Patapsco Valley State Park	Howard/Baltimore	162	1,452.0	278	2,587.0	440	4,039.0
Gunpowder Falls State Park	Baltimore	30	294.2	82	622.7	112	916.9
Frostburg Watershed	Garrett	0	0	1,242	12,169.0	1,242	12,169.0
Green Ridge State Forest	Allegany	129	1,817.1	357	3,690.0	486	5,507.1
Big Run SRSF	Garrett	896	8,784.6	378	3,520.0	1,274	12,304.6
Wolf Swamp SRSF **	Garrett	383	4,331.0	5,739	68,560.0	6,122	72,891.0
Laurel Run SRSF	Garrett	240	2,441.5	0	0	240	2,441.5
Patuxent River	Howard	47	401.3	192	1,536.5	239	1,937.8
Wye Island	Queen Annes	50	358.3	0	0	50	358.3
South Mountain State Park	Washington	29	214.2	0	0	29	214.2
Susquehanna State Park	Harford	0	0	27	348.0	27	348.0
Total	**n/a**	**2,045**	**21,243.7**	**8,903**	**98,011.2**	**10,948**	**119,254.9**

*d.b.h. = diameter of the tree trunk 4.5 feet above the ground

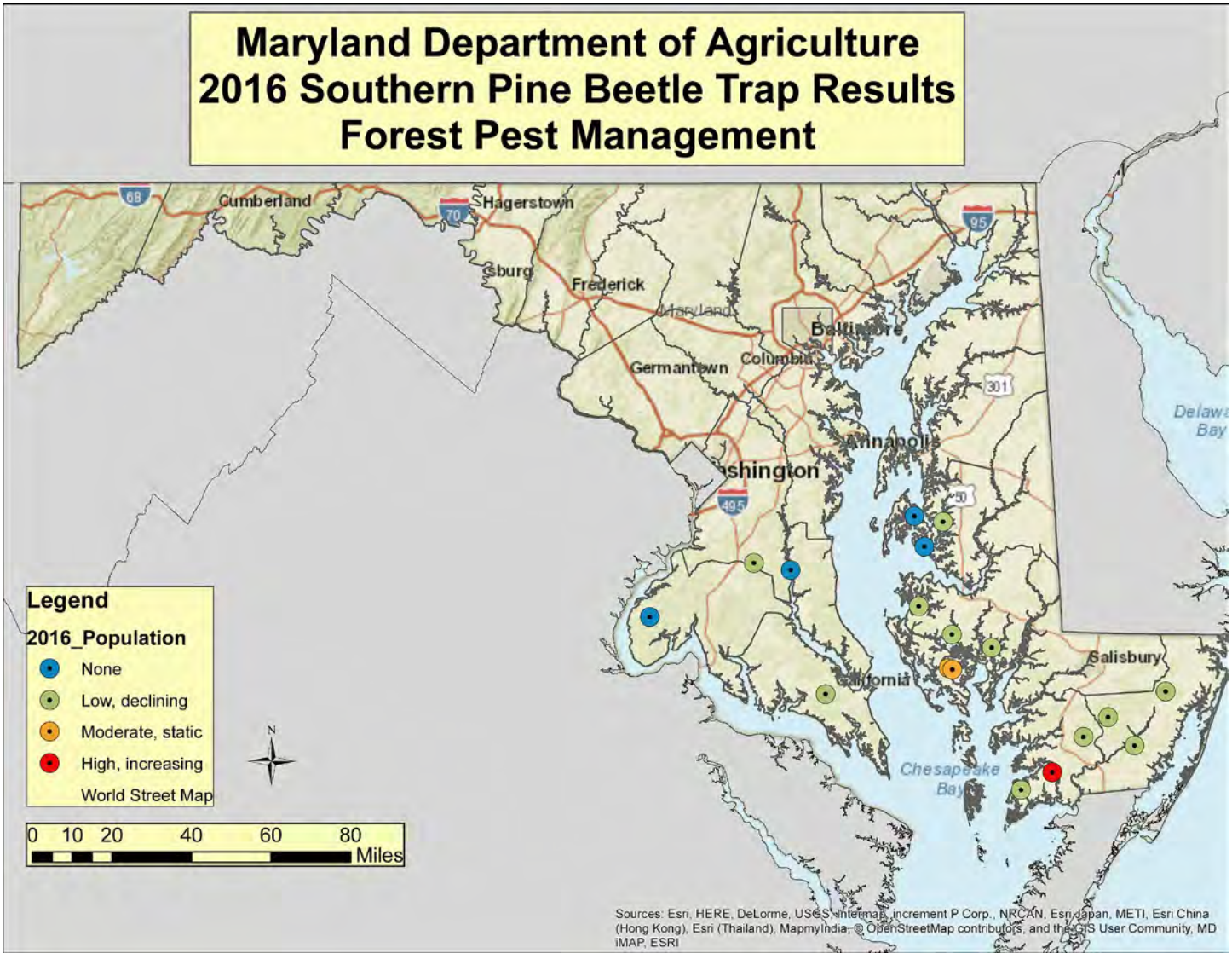
**Treatments done by Forest Pest Management and Maryland Conservation Corps (Department of Natural Resources)

Hemlock Woolly Adelgid Suppression Efficacy

Treatment efficacy surveys have been conducted annually since 2006. Treated trees had an average 79 percent reduction in HWA populations when measured 1 year post treatment; non-treated trees had an average 24 percent increase in HWA populations when measured over the same time period. In 2015–16 efficacy surveys were conducted at treatment sites in Garrett, Montgomery, and Baltimore Counties.

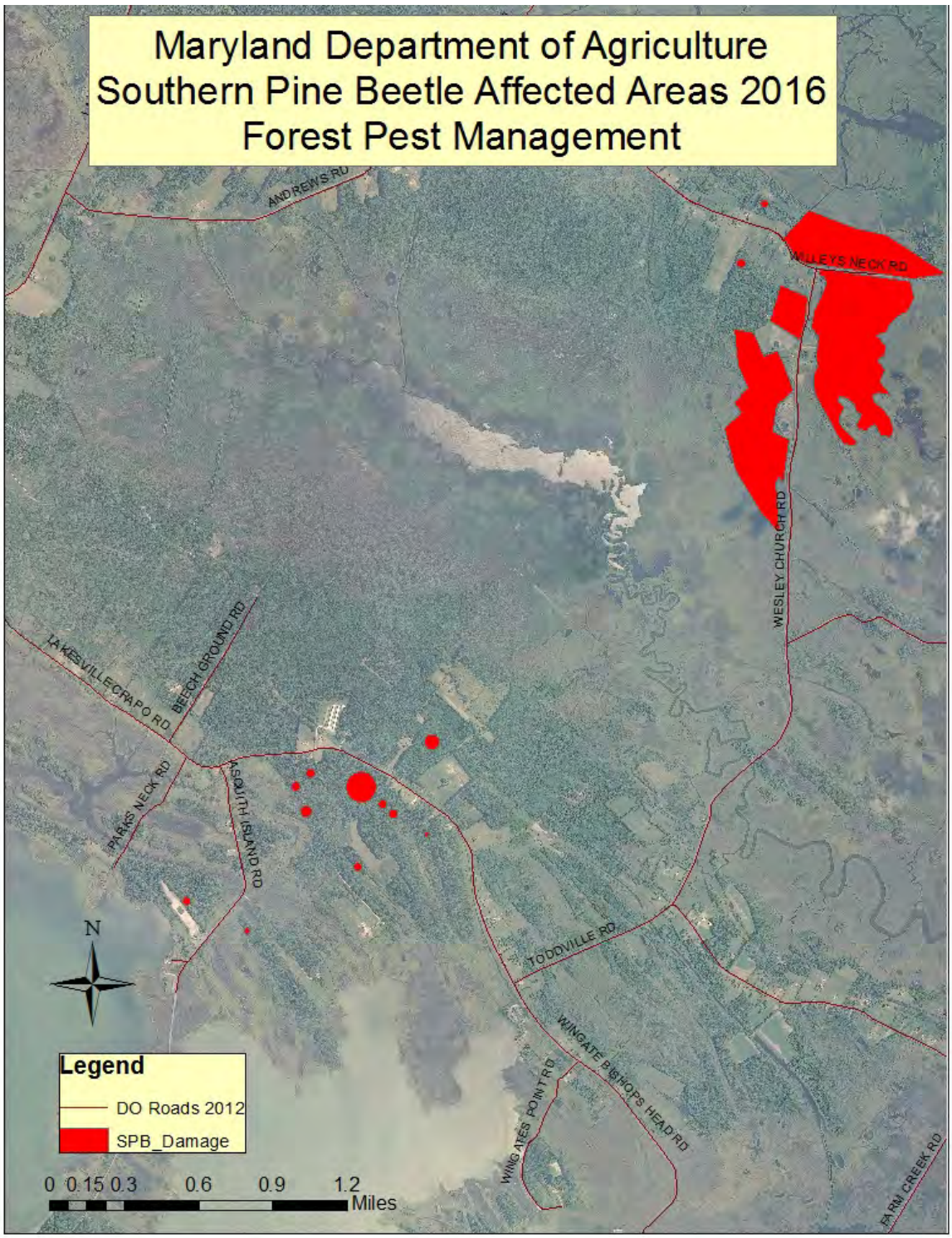
Southern Pine Beetle

The southern pine beetle (SPB) is one of the most destructive insect pests of pines. Maryland is at the northern edge of its range, and this pest is commonly found on the lower Eastern Shore and in southern Maryland. Since 1989, Maryland has participated in a multistate SPB survey throughout the Southern United States using pheromone-baited traps. Trap data indicated that SPB numbers would continue to remain low in 2016. Populations have been below outbreak level since 1994.



MDA 2016 southern pine beetle trap results.

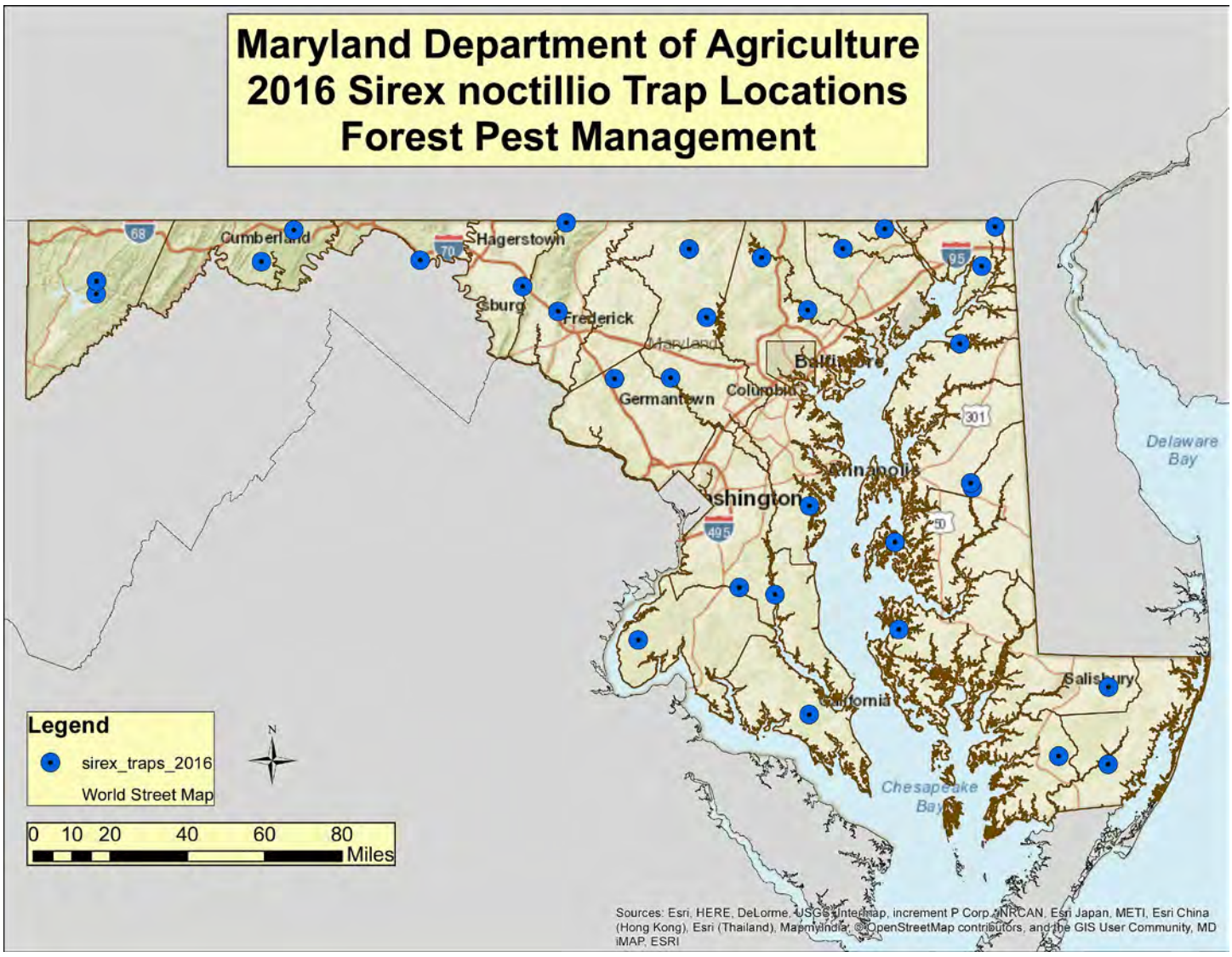
However, an outbreak of SPB killed more than 100 acres in Dorchester County in 2015. This outbreak has continued to grow; an additional site of SPB in lower Dorchester County was identified in July 2016. This brings the affected acreage close to 300 acres. Landowners in these areas were notified and were advised to contact the County Forester to develop Forest Management Plans. A trap in Somerset County indicated that the SPB population there is increasing as well; however, no trees have been identified as killed by SPB.



MDA areas affected by southern pine beetle in 2016.

Sirex noctilio (Woodwasp)

Sirex woodwasp has been the most common species of exotic woodwasp detected at United States ports-of-entry associated with solid wood packing materials. Recent detections of this woodwasp outside of port areas in the United States have raised concerns because this insect has the potential to cause significant mortality of pines. The Sirex woodwasp has not been detected in Maryland but is known to be in Pennsylvania. To detect this insect, MDA placed two traps per county in the northern tier counties and one trap for all other counties, for a total of 31 traps in pine woods. All 2016 traps were negative.

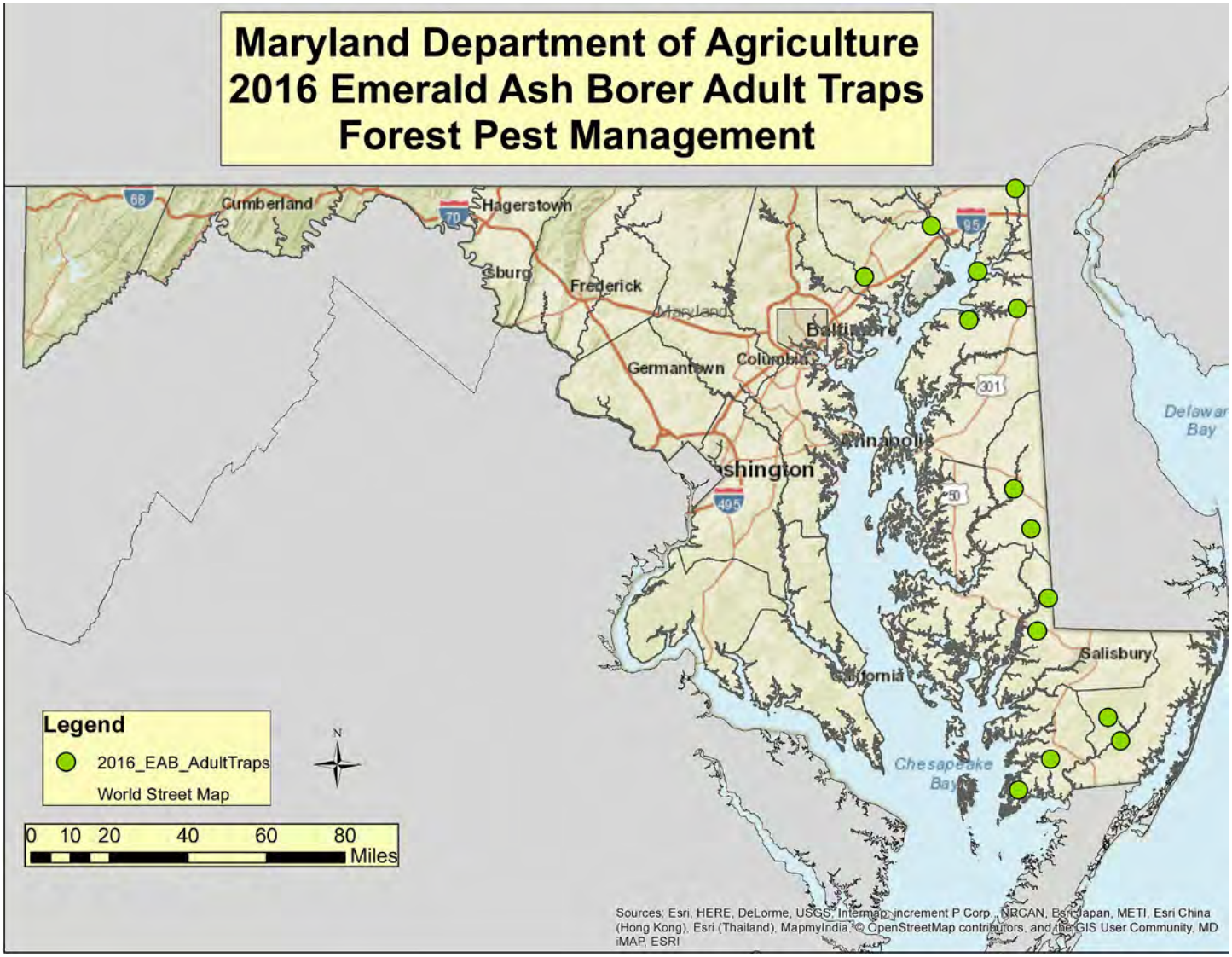


MDA 2016 Sirex noctilio *trap locations.*

Emerald Ash Borer

The MDA Forest Pest Management Section put up 12 green funnel traps, 2 traps in each county that has not previously been found to be positive for EAB. All traps were negative for EAB in 2016.

Emerald ash borer parasitoids were relased in five State Parks and one arboretum. Locations were chosen based on the presence of ash and low populations of emerald ash borer. Release locations were Big Run State Park in western Maryland; Martinak State Park on the Eastern Shore of Maryland; and Cylburn Arboretum, Susquehanna State Park, Gunpowder State Park, and Patapsco Valley State Park in central Maryland. In 2016, 39,500 *Oobius agrili*, 30,038 *Tetrastichus planipennisi*, and 1,867 *Spathius agrili* were released across these six sites.



MDA 2016 emerald ash borer adult traps.

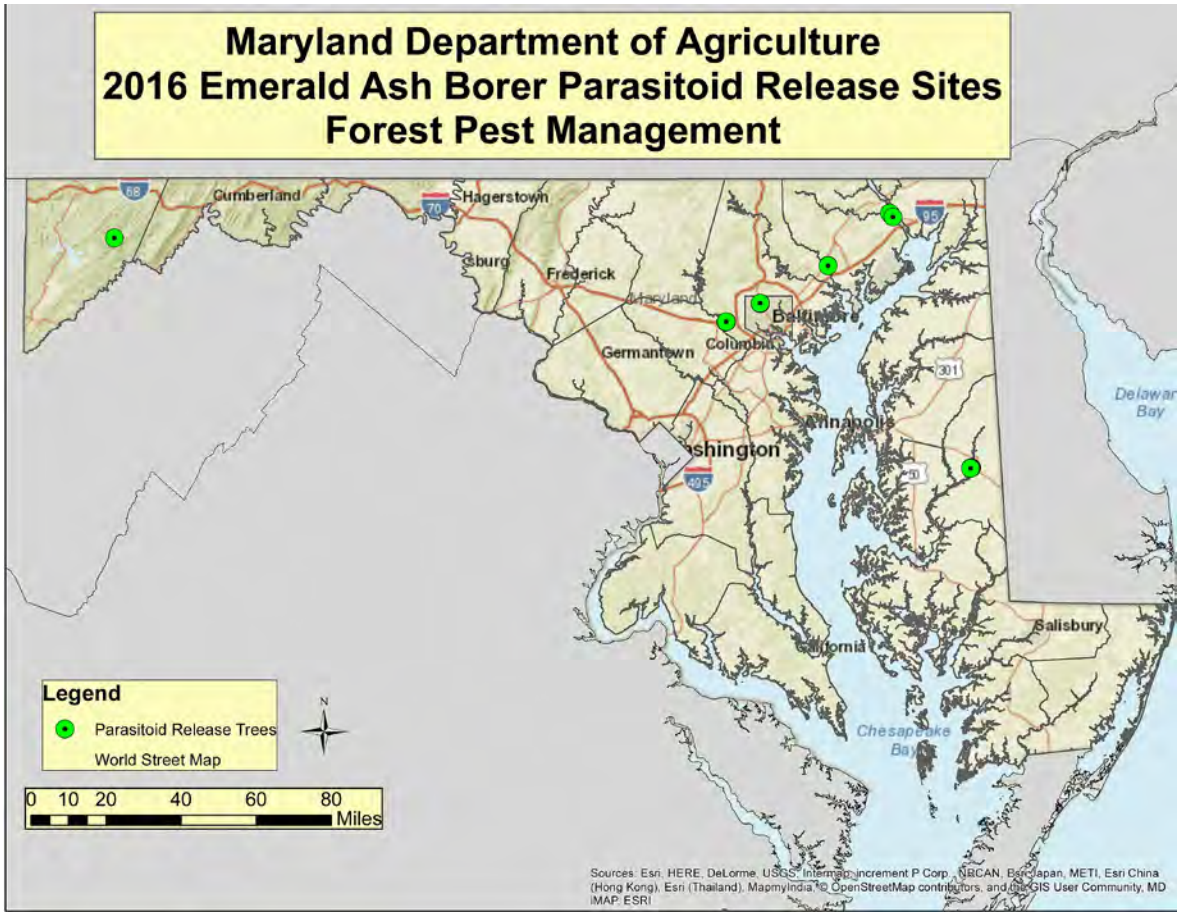
Maryland Department of Agriculture
Forest Pest Management
2016 Emerald Ash Borer Parasitoid Release Summary

Site Name	Latitude	Longitude	Oa[1] # Vials	Oa[1] Total	Tp[2] # Bolts	Tp[2] Total	Tp[2] Adults # Females	Tp[2] Adults # Males	Tp[2] Adults Total	Sa[3] # Cups	Sa[3] Total
Susquehanna State Park	39.61383	-76.15099	60	6,000	59	3,213	800	279	1,079	0	0
Patapsco Valley State Park	39.29593	-76.78358	52	5,200	68	3,236	609	201	910	22	774
Gunpowder Falls State Park	39.46263	-76.39238	61	6,100	61	3,014	796	230	1,026	0	0
Cylburn Arboretum	39.3513	-76.65368	48	4,800	67	3,269	1,000	299	1,299	16	584
Martinak State Park	38.86002	-75.84153	106	10,800	149	6,430	1,543	371	1,914	8	299
Big Run State Park	39.5449	-79.13853	66	6,600	83	4,021	483	144	627	8	210
Totals	**n/a**	**n/a**	**393**	**39,500**	**487**	**23,183**	**5,231**	**1,524**	**6,855**	**54**	**1,867**

[1]Oa = *Oobius agrili*

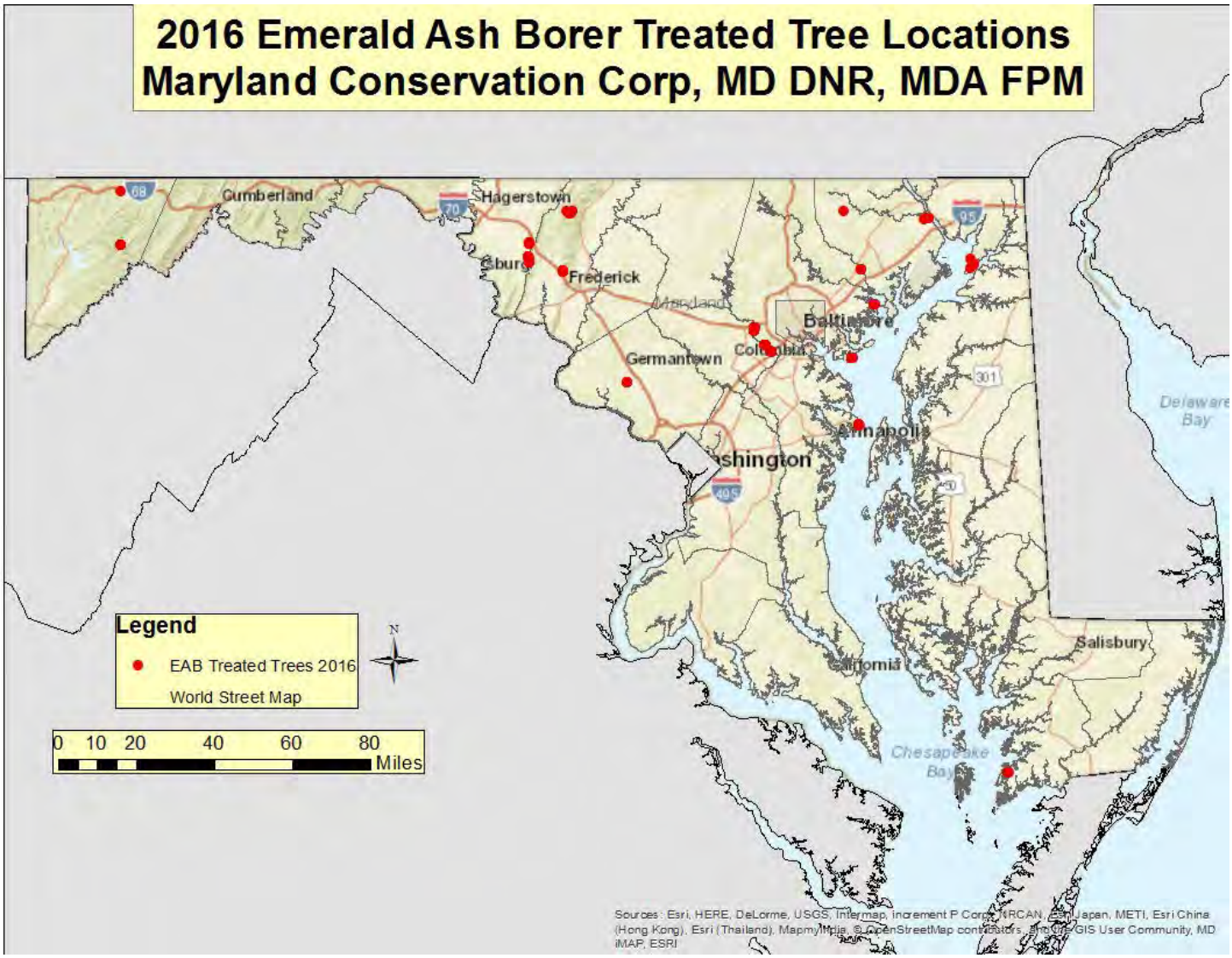
[2]Tp = *Tetrastichus planipennisi*

[3]Sa = *Spathius agrili*



MDA 2016 emerald ash borer parasitoid release sites.

In addition, FPM personnel supervised treatments of ash trees across Maryland. This work was done in State Parks in cooperation with the Maryland Department of Natural Resources and the Maryland Conservation Corp. A total of 299 ash trees (representing 4,980 inches d.b.h.) were treated using 31,495 ml of TREE-äge® (emamectin benzoate).

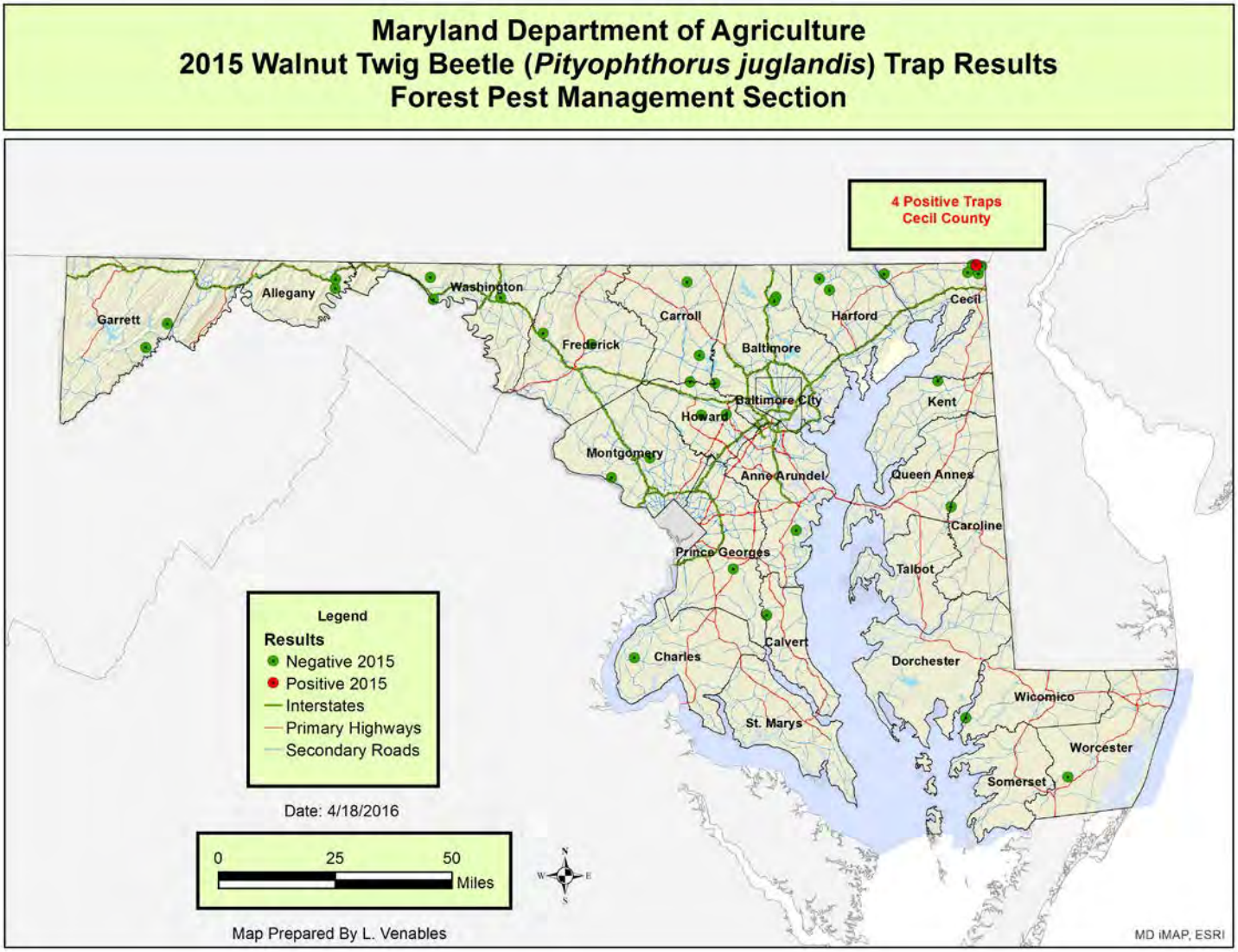


Location of trees treated for emerald ash borer in 2016.

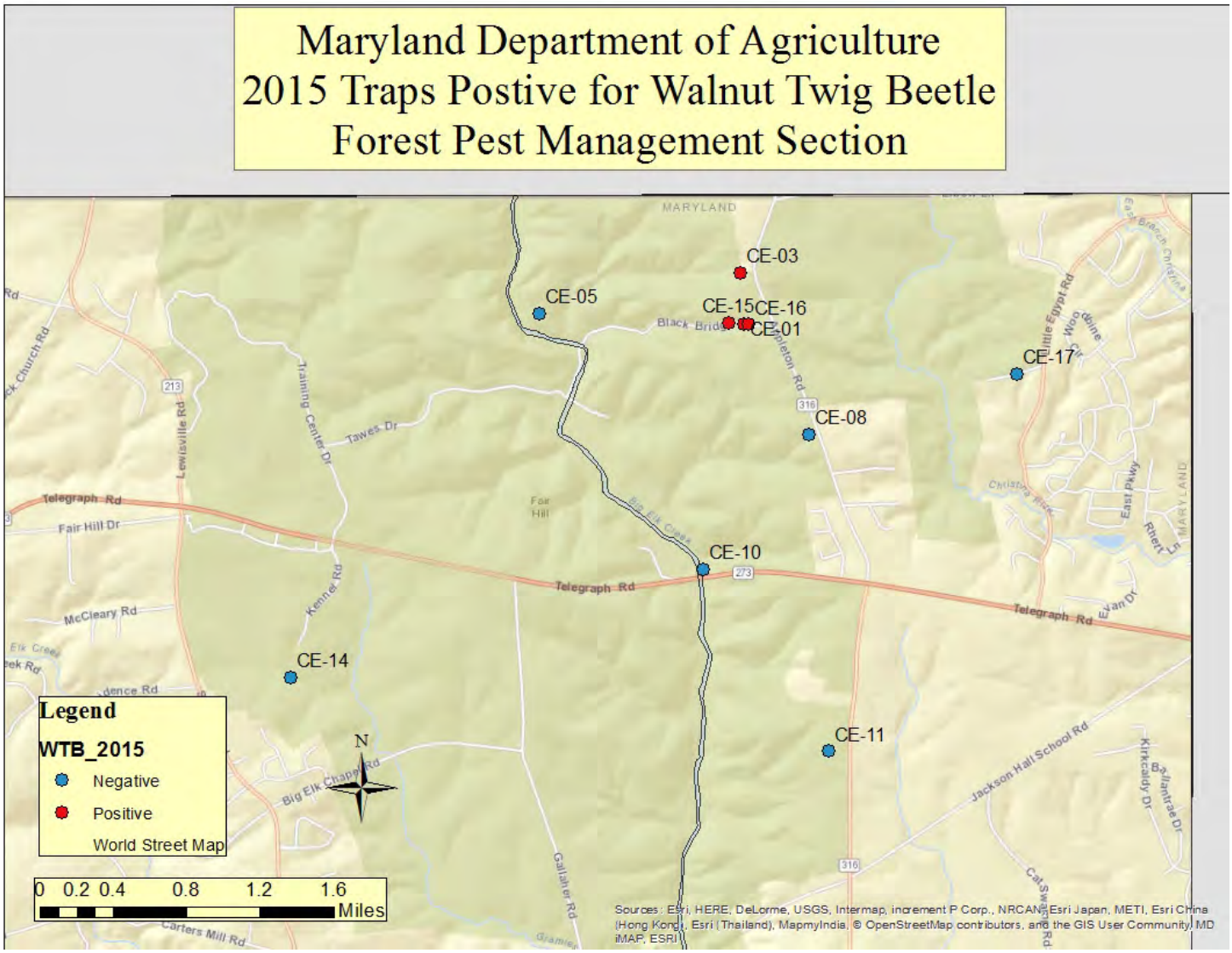
Thousand Cankers Disease of Black Walnut and Walnut Twig Beetle

Eastern black walnuts planted in the Western United States have experienced dieback and mortality. The walnut twig beetle (WTB) spreads thousand cankers disease (TCD). An infested tree usually dies within 3 years of visible symptoms. This beetle and disease had not been reported in the natural range of the eastern black walnut until they were discovered in Tennessee in 2010. Since then, TCD has been found in several States. Maryland, along with other Mid-Atlantic States, started surveying for this disease in 2011. Walnut twig beetle was detected in Maryland in 2013. Thousand cankers disease was confirmed in October 2014. The northeastern corner of Cecil County has been quarantined.

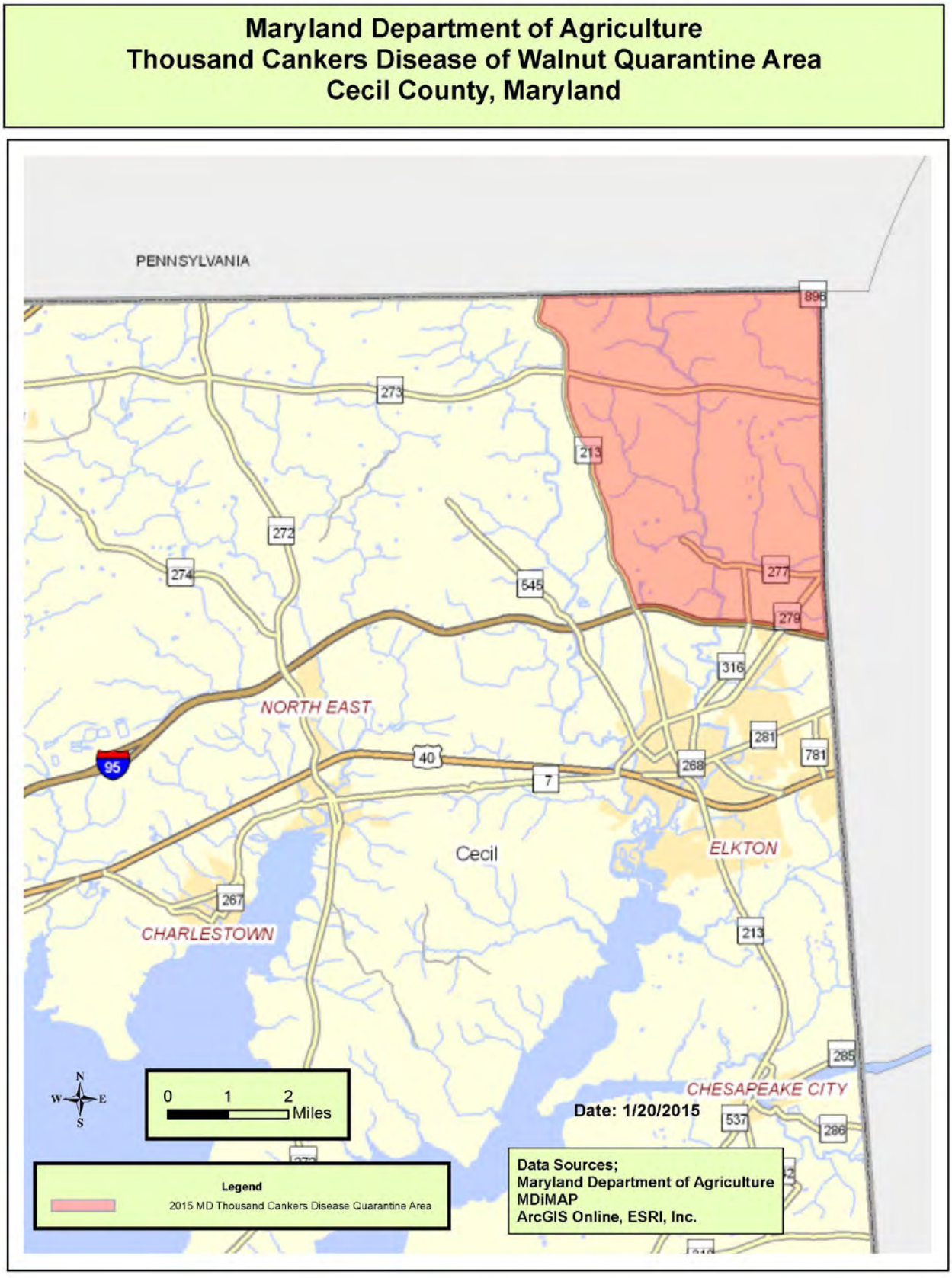
Forty traps baited with a pheromone for the WTB were set statewide to detect new infestations. Traps were checked every 2 weeks and field samples were collected, sorted and labeled in the office, and sent to PDA for identification. Four traps were positive for WTB. These traps (CE01, CE03, CE15, and CE16) were all within 1,500 feet of the original positive find (CE01). Sixteen beetles were collected across the four traps. These beetles were collected in May, August, and October of 2015. Specimens from the 2016 trap collection have not been completely processed.



MDA 2015 walnut twig beetle trap results.



MDA 2015 traps positive for walnut twig beetle.



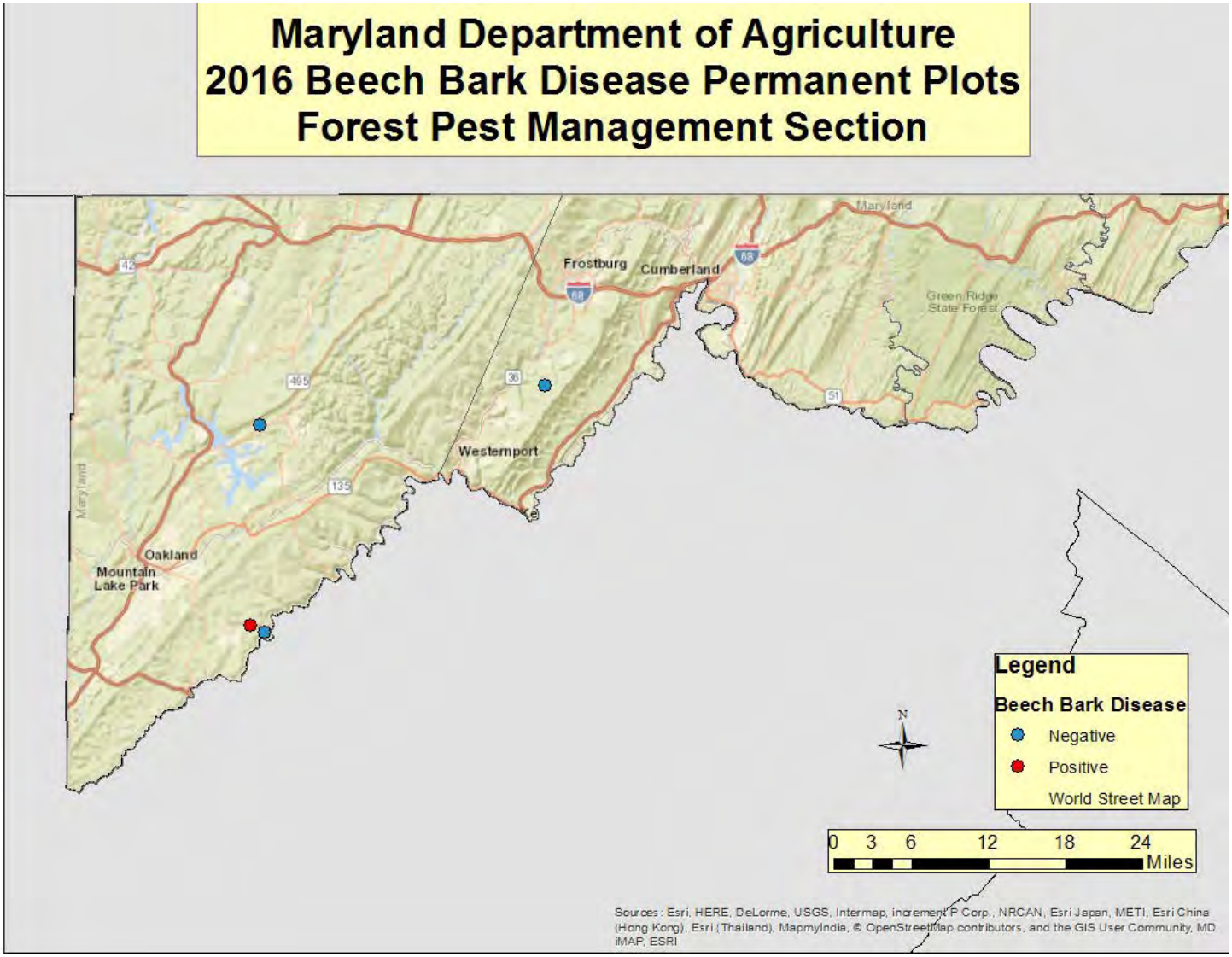
MDA thousand cankers disease of walnut quarantine area in Cecil County, Maryland.

Bacterial Leaf Scorch

Bacterial leaf scorch was prevalent all through the State this year. It was observed not only on ornamental trees but throughout Maryland in forested areas. This disease was more severe this year than last.

Beech Bark Disease

Beech bark disease has been found only in Garrett County. There are 154,473 acres of infested forest in Garrett County. Four permanent beech bark disease monitoring sites were set up in 2013.



MDA 2016 beech bark disease permanent plots.

Saltwater Intrusion

In July 2016, a saltwater intrusion delineation flight was flown across the Lower Eastern Shore. This flight mirrored the flight taken in 2013 to determine the areas affected by saltwater intrusion and to map changes.

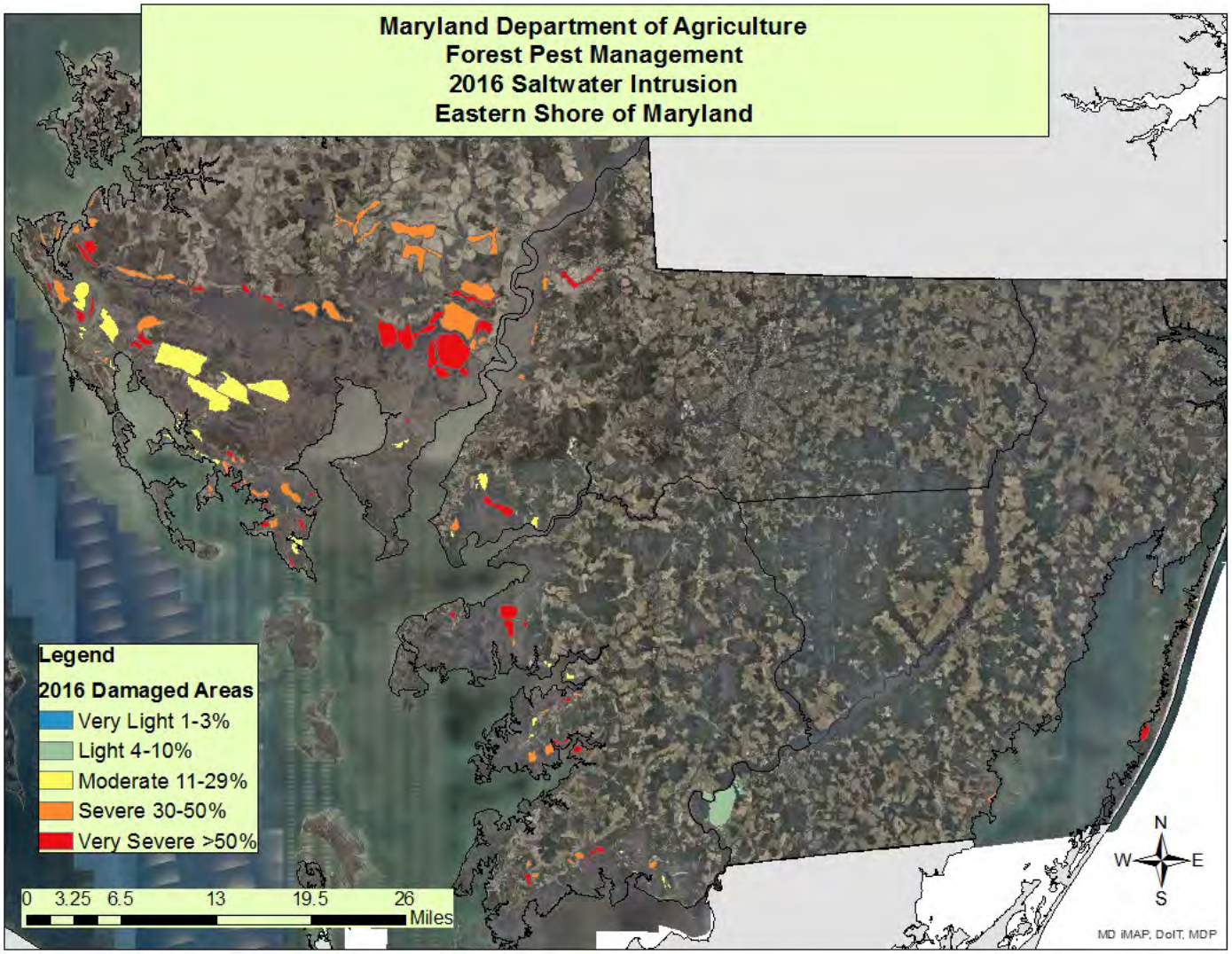
A total of 50,406 acres of forest were found to be affected by saltwater intrusion. The majority of the affected acres (39,503) were in Dorchester County. Somerset, Worcester, and Wicomico Counties were also affected by saltwater intrusion. This is in contrast to 2013 when 18,117 acres were found to be affected by saltwater intrusion. Two-thirds of the mapped forests were either very severely or severely affected by saltwater intrusion. Many of the areas that were delineated are also experiencing increases in southern pine beetle.

Maryland Department of Agriculture
Forest Pest Management
Saltwater Intrusion Flight Summary by County

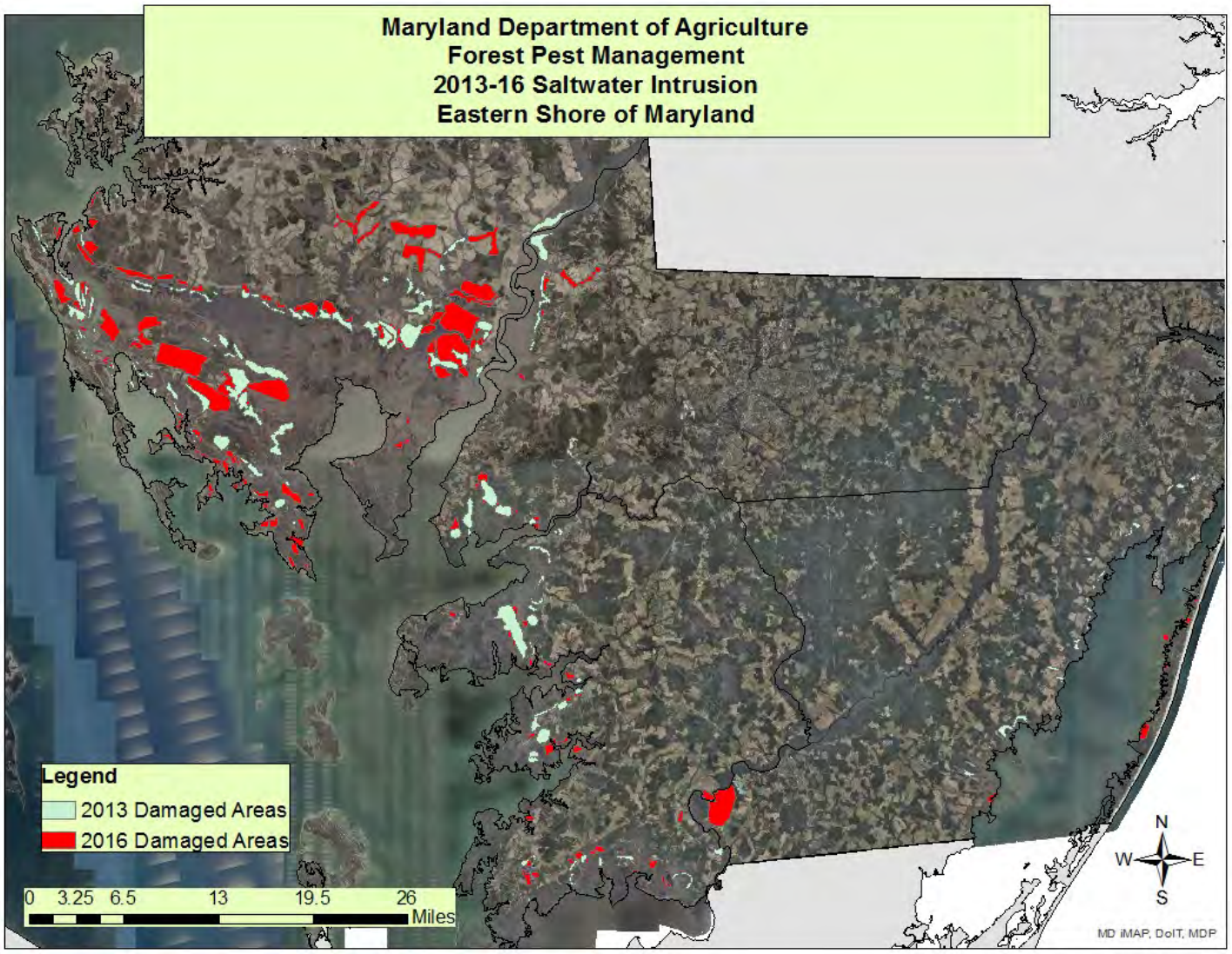
County	Acres Affected
Dorchester	39,503
Somerset	4,868
Wicomico	2,922
Worcester	3,113
Total	**50,406**

Maryland Department of Agriculture
Forest Pest Management
Saltwater Intrusion Flight Summary by Percentage of Forest Affected

Percentage of Forest Affected	Acres
Very light (1-3%)	25
Light (4-10%)	3,222
Moderate (11-29%)	13,847
Severe (30-50%)	17,788
Very Severe (>50%)	15,524
Total	**50,406**

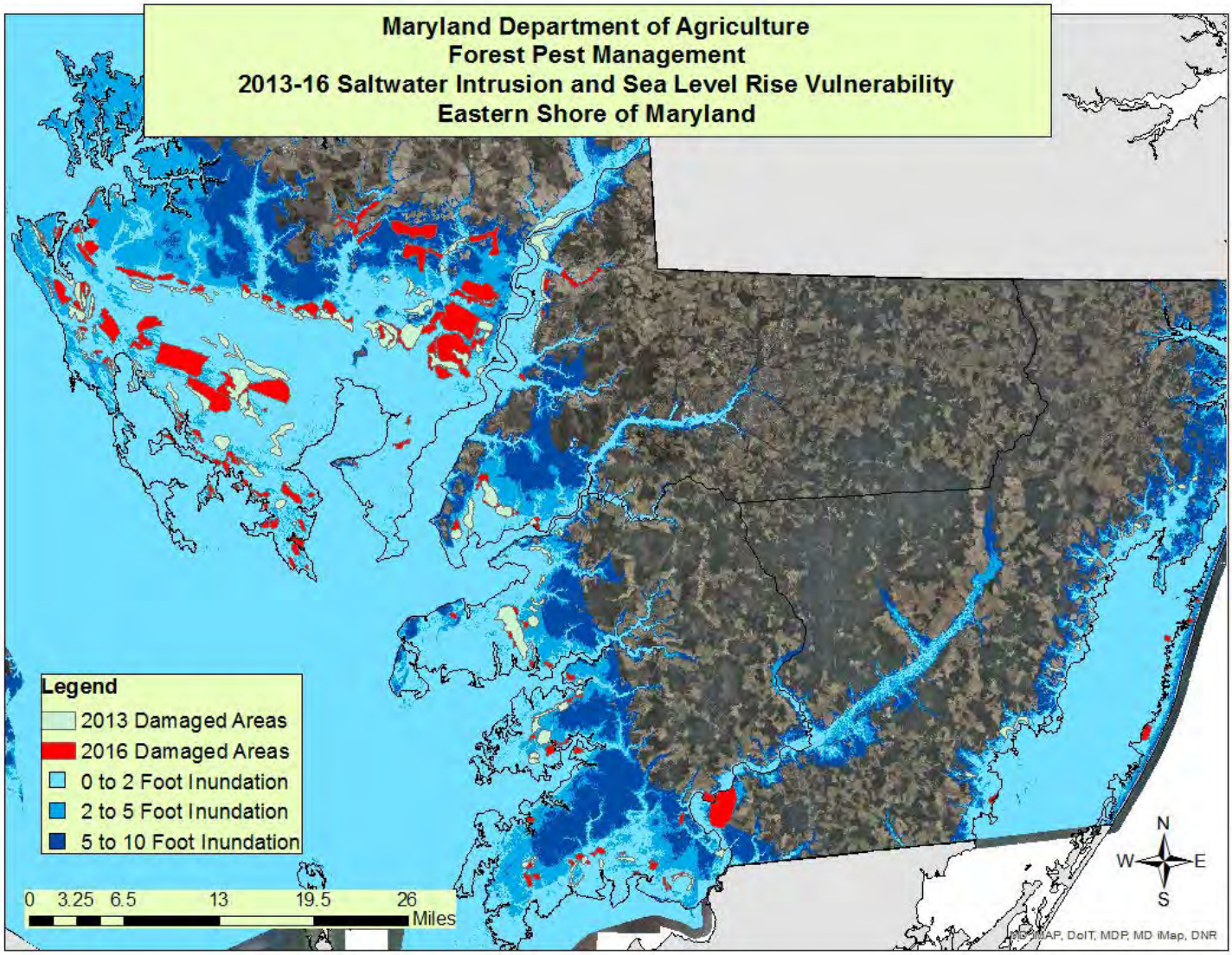


MDA 2016 saltwater intrusion on the Eastern Shore of Maryland.

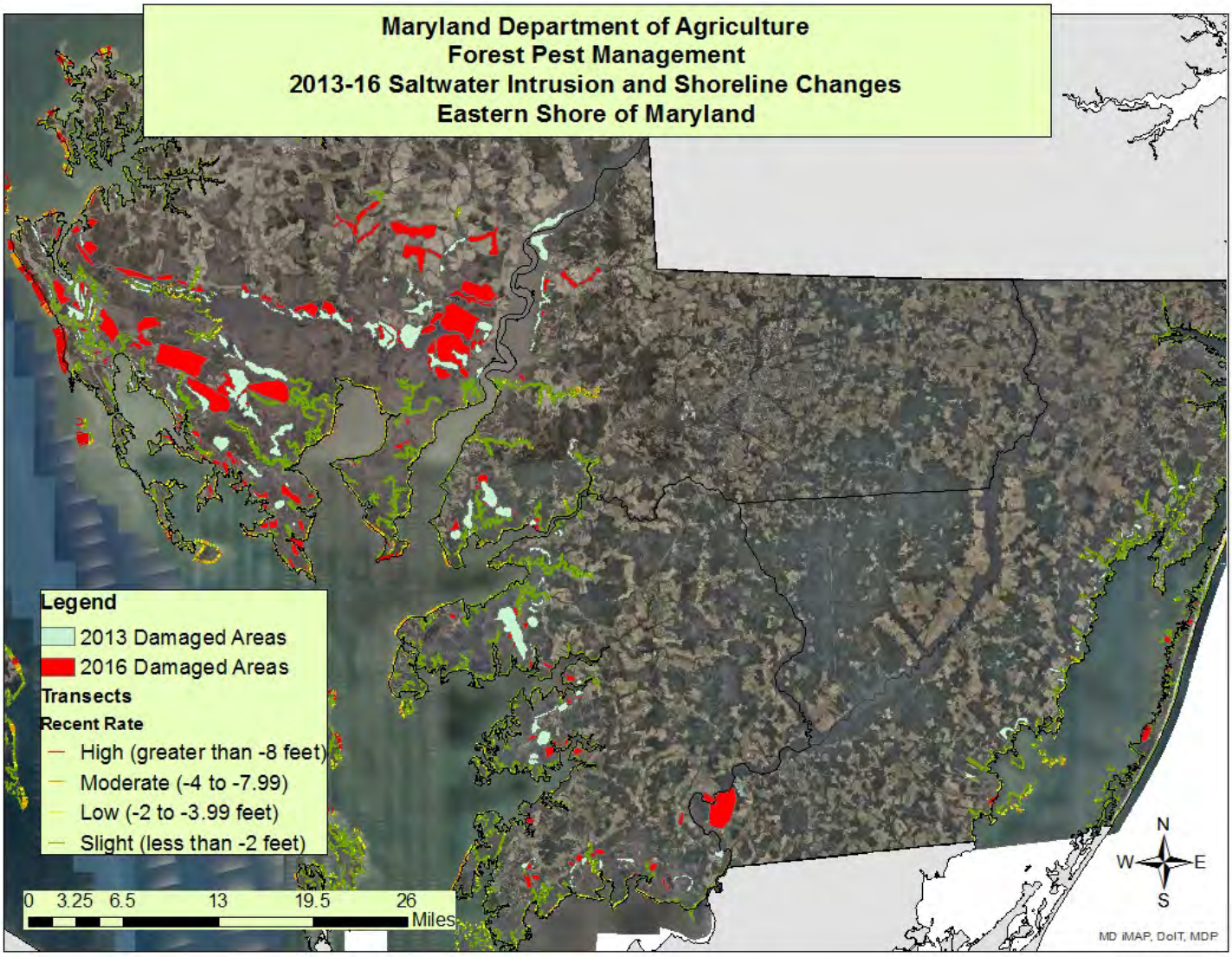


MDA saltwater intrusion damage on the Eastern Shore of Maryland in 2013 and 2016.

Looking into the future, the Lower Eastern Shore, and Dorchester County in particular, are at risk for increased problems with saltwater intrusion and southern pine beetle. The map below shows the areas at risk from inundation in the event of sea level rise. The map on the next page shows at what rate shorelines have changed in the last 150 years in reference to the current saltwater intrusion-damaged areas.



MDA saltwater intrusion in 2013 and 2016 and sea level rise vulnerability for the Eastern Shore of Maryland.



MDA saltwater instrusion in 2013 and 2016 and shoreline changes for the Eastern Shore of Maryland.

Reference

Land Cover Map:

Jin, S.; Yang, L.; Danielson, P.; Homer, C.; Fry, J.; Xian, G. 2013. A comprehensive change detection method for updating the National Land Cover Database to circa 2011. Remote Sensing of Environment, 132: 159 – 175. http://www.sciencedirect.com/science/article/pii/S0034425713000242. (1 March 2016).

Forest Land Ownership:

Oswalt, Sonja N.; Smith, W. Brad; Miles, Patrick D.; Pugh, Scott A. 2014. Forest resources of the United States, 2012: a technical document supporting the Forest Service update of the 2010 RPA Assessment. Gen. Tech. Rep. WO–91. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. Table 2. http://www.fs.fed.us/sites/default/files/media/types/publication/field_pdf/GTR-WO-91.pdf. (1 March 2016).

Net Volume of Growing Stock on Timberland by Species:

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Forest Health Programs

State forestry agencies work in partnership with the U.S. Forest Service to monitor forest conditions and trends in their State and respond to pest outbreaks to protect the forest resource.

U.S. Department of Agriculture
Forest Service
Northeastern Area
State and Private Forestry
11 Campus Blvd., Suite 200
Newtown Square, PA 19073
https://www.na.fs.fed.us

Forest Health Protection
Northeastern Area
State and Private Forestry
180 Canfield Street
Morgantown, WV 26505
304–285–1545

Maryland Department of Agriculture
Forest Pest Management
Wayne A. Crawley Jr. Building
50 Harry S. Truman Parkway
Annapolis, MD 21401-8960
410–841–5922
http://mda.maryland.gov/plants-pests/pages/forest_pest_management.aspx

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